Fisher Controls

Instruction Manual

Type 1051 & 1052 Rotary Actuators, Size 30 & Larger

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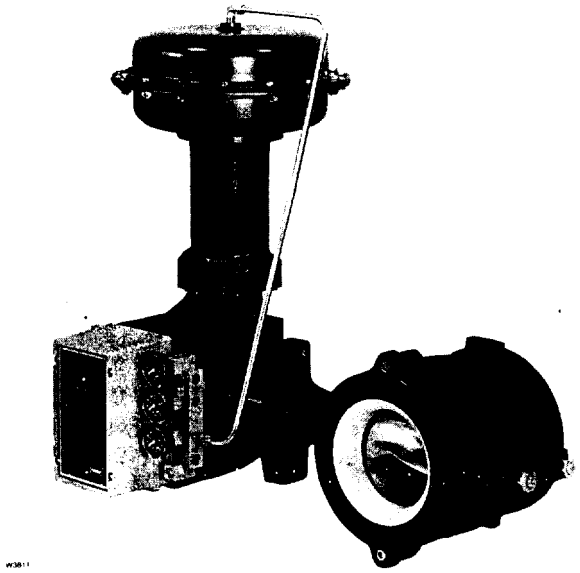
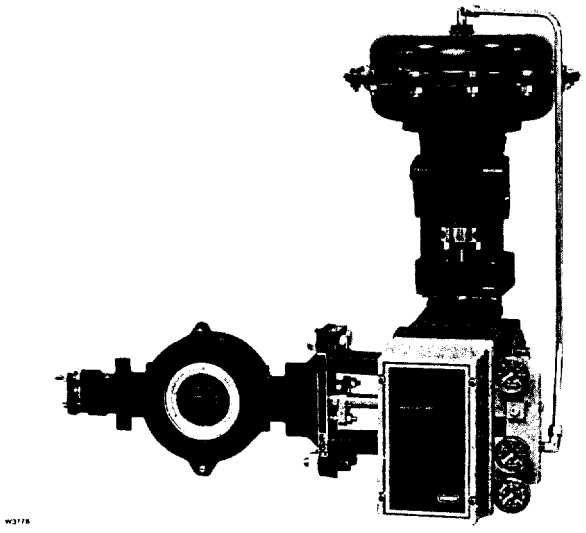
May 1983 *Form 5062*

Contents



TYPE 1051 ACTUATOR WITH TYPE 3610J POSITIONER AND DESIGN V100 VEE-BALL® VALVE



TYPE 1052 ACTUATOR WITH TYPE 3610J POSITIONER AND TYPE 8510 Edisc® VALVE

Figure 1. Type 1051 and 1052 Actuators Mounted on Control Valves

Introduction

Scope of Manual

This instruction manual includes installation, adjustment, operation, maintenance, and parts ordering information for the Type 1051 (sizes 30, 40, and 60) and Type 1052 (sizes 30, 40, 60, and 70) diaphragm rotary actuators (see figure 1), the optional top-mounted handwheel, and both

Table 1. Type 1051 and 1052 Actuator Specifications

OPERATING PRINCIPLE	**Action:** Direct—Increasing loading pressure extends the diaphragm rod out of the spring barrel **Service:** ■ On-off without positioner; ■ throttling with positioner for Type 1051 actuators and throttling with or without positioner for Type 1052 actuator
ACTUATOR SIZES	**Type 1051:** ■ 30, ■ 40, and ■ 60 **Type 1052:** ■ 30, ■ 40, ■ 60, and ■ 70 A size 20 actuator is available but is covered in a separate instruction manual.
MAXIMUM DIAPHRAGM CASING PRESSURE	**Size 30:** 80 psig (5.5 bar) **Size 40:** 65 psig (4.5 bar) **Size 60:** 40 psig (2.8 bar) **Size 70:** 55 psig (3.8 bar)
MAXIMUM VALVE SHAFT ROTATION	■ 90, ■ 75, or ■ 60 deg with optional stops
ACCEPTABLE VALVE SHAFT DIAMETERS, IN. (mm)	**Size 30:** ■ 1/2 (12.7), ■ 5/8 (15.9), or ■ 3/4 (19.1) **Size 40:** ■ 1/2 (12.7), ■ 5/8 (15.9), ■ 3/4 (19.1), ■ 7/8 (22.2), ■ 1 (25.4), or ■ 1-1/4 (31.8) **Size 60:** ■ 3/4 (19.1), ■ 7/8 (22.2), ■ 1 (25.4), ■ 1-1/4 (31.8), ■ 1-1/2 (38.1), ■ 1-3/4 (44.5), or ■ 2 (50.8) **Size 70:** ■ 1-1/4 (31.8), ■ 1-1/2 (38.1), ■ 1-3/4 (44.5), or ■ 2 (50.8)
STROKING TIME	Dependent on actuator size, rotation, spring rate, initial spring compression, and supply pressure. If stroking time is critical, consult the Fisher sales office or sales representative
MATERIAL TEMPERATURE CAPABILITIES	**Nitrile Diaphragm or O-Rings**[1]: −40 to 180°F (−40 to 82°C) **Silicone Diaphragm:** −40 to 300°F (−40 to 149°C)
TRAVEL INDICATION	Graduated disk and pointer combination located on actuator end of valve shaft
PRESSURE CONNECTIONS	1/4 in. NPT female
MOUNTING POSITIONS	See figures 3 and 4
APPROXIMATE WEIGHTS	See table 2
ADDITIONAL SPECIFICATIONS	For casing pressure ranges and for material identification of the parts, see the parts list

1. Nitrile O-rings are used in optional top-mounted handwheel, adjustable down travel stop, and adjustable up travel stop assemblies.

the optional up and down travel stops. The Type 1052, size 20 actuator is covered in a separate instruction manual. Instructions for the control valve body, the positioner, and accessories are also covered in separate manuals.

Description

The Type 1051 and 1052 diaphragm rotary actuators are pneumatic spring-return actuators for use with rotary-shaft control valves. The Type 1051 actuator can be used for on-off service, or it can be used for throttling service when equipped with a valve positioner. The Type 1052 actuator can be used for on-off service, or it can be used for throttling service when equipped with or without a valve positioner. The Type 1052 actuator spring is adjustable.

The top-mounted handwheel can be applied for infrequent service as a manual handwheel actuator with Type 1051 and 1052 actuators. Also, an adjustable up travel stop can be added to the actuator to limit its stroke in the upward direction, or an adjustable down travel stop can be added to limit actuator stroke in the downward direction.

Specifications

Specifications are shown in table 1 for Type 1051 and 1052 actuators. Specifications for a given Type 1051 or 1052 actuator as it originally comes from the factory are stamped on a nameplate (figure 2 and key 42, figures 7 and 8) attached to the actuator.

Table 2. Approximate Actuator Weights

SIZE	TYPE 1051				TYPE 1052				TOP-MOUNTED HANDWHEEL	
	Cast Iron Construction[1]		Aluminum Construction[2]		Cast Iron Construction[1]		Aluminum Construction[2]			
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
30	65	29	55	25	59	27	58	26	11	5.0
40	94	43	86	39	99	45	90	41	16	7.3
60	197	89	175	79	203	92	180	82	24	11
70	---	---	---	---	272	123	252	114	47	21.3

1. Cast iron spring barrel and housing.
2. Sizes 30, 40, and 60—aluminum spring barrel, housing, and housing cover. Size 70—cast iron spring barrel and aluminum housing and housing cover.

Installation

When an actuator and valve body are shipped together, the actuator is normally mounted on the valve. Follow the valve body instructions when installing the control valve in the pipeline, and then perform the procedures presented in the Loading Connections portion of this Installation section. If the actuator is shipped separately or if it is necessary to mount the actuator on the valve, perform the procedures presented in the Actuator Mounting portion of this section.

WARNING

To avoid personal injury or property damage caused by bursting of pressure-retaining parts, be certain the diaphragm casing pressure does not exceed the diaphragm casing pressure limits listed in table 1. Use pressure-limiting or pressure-relieving devices to prevent the diaphragm casing pressure from exceeding these limits.

Actuator Mounting

Use the following steps to connect a valve body and an actuator that have been ordered separately. Key numbers refer to figure 7 for Type 1051 actuators and to figure 8 for Type 1052 actuators.

1. Unscrew cap screws and washers (keys 34 and 63), and remove cover (key 33).

2. Consult figures 3 and 4 for available mounting styles and positions. The actuator is normally positioned vertically with the valve in a horizontal pipeline.

Note

Due to its weight, the Type 1052 size 70 actuator must be externally supported if mounted in the horizontal position.

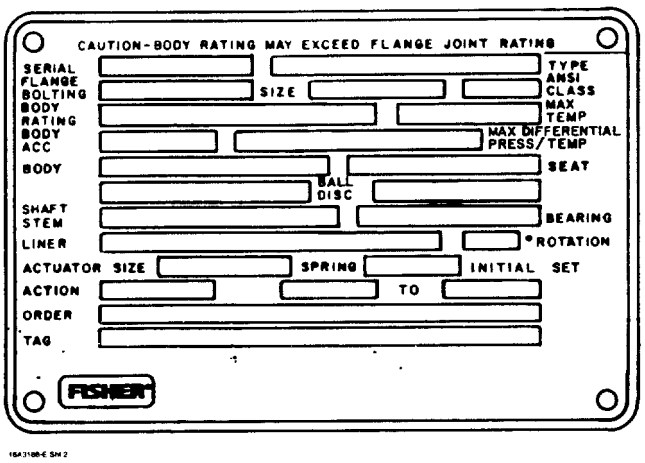


Figure 2. Nameplate Used on Type 1051 and 1052 Actuators

3. Slide the mounting yoke (key 22) over the valve shaft, and secure it to the valve with the valve mounting cap screws. For butterfly valves, use a bolting torque of 30 foot-pounds (41 newton•meters) for 1/2 through 1-inch (12.7 through 25.4 mm) diameter valve shafts and 100 foot-pounds (135 newton•meters) for 1-1/4 and 1-1/2 inch (31.8 and 38.1 mm) diameter valve shafts. For other valve types, refer to the appropriate valve body instruction manual for bolting torques for these cap screws.

CAUTION

Refer to table 3 for actuator bolt torque requirements. Exceeding any torque requirement may impair the safe operation of this actuator.

4. Screw the left-hand threaded locknut (key 58) onto the diaphragm rod (key 10) as far as possible.

5. Screw the turnbuckle (key 57) as far as it will go onto the actuator rod.

6. Screw the locknut (key 16) as far as it will go onto the rod end bearing (key 17). Thread this assembly completely into the turnbuckle (key 57).

Table 3. Recommended Bolting Torques

KEY NUMBER	ACTUATOR SIZE							
	30		40		60		70	
	Ft-Lb	N•m	Ft-Lb	N•m	Ft-Lb	N•m	Ft-Lb	N•m
6	15	20	15	20	15	20	15	20
7 & 8	30	41	30	41	30	41	75	102
9	25	34	25	34	75	102	75	102
16	10	14	25	34	45	61	75	102
18	16	22	60	81	120	163	200	271
21	7	9	7	9	16	22	50	68
23	25	34	25	34	60	81	60	81
28	25	34	60	81	120	163	200	271
34	25	34	25	34	60	81	60	81
40	7	9	7	9	7	9	7	9
54 (handwheel)	25	34	25	34	25	34	25	34
54 (down stop)	15	20	20	27	49	66	51	69
58	35	47	75	102	120	163	120	163
141	30	41	30	41	30	41	30	41

7. If the lever (key 27) is attached to the rod end bearing, remove the cap screw and hex nut (keys 18 and 19).

8. If the Type 1052 spring adjustment has been changed, complete the Initial Compression portion of the Adjustment section before proceeding.

9. Consult the appropriate valve body instruction manual for lever/valve shaft orientation marks, and slide the lever into place, see figure 5. Clamp with the cap screw (key 28).

10. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by moving the actuator off its up travel stop with a regulated air source and adjusting the turnbuckle (key 57) slightly.

11. Apply Loctite[1] 271 or equivalent thread-locking compound (key 77) to the threads of the cap screw (key 18).

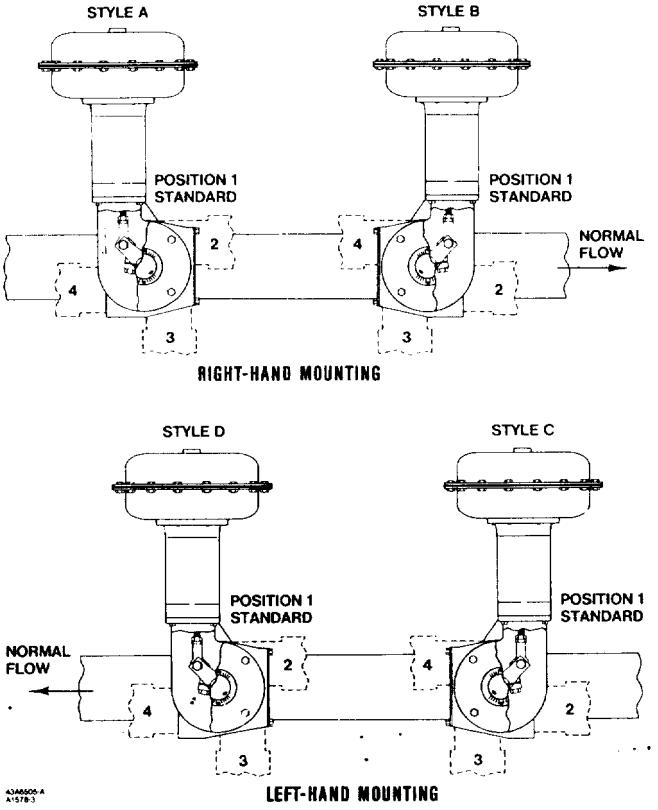
12. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19).

Note

Tighten the cap screw (key 18) to the recommended bolt torque shown in table 3.

13. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly.

a. If no handwheel actuator is to be used, position travel indicator (key 37) according to the valve position just noted. Replace the cover (key 33), and secure with washers and cap screws (keys 34 and 63). If holes in the cover and housing (key 20) do not align, temporarily loosen cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.



MOUNTING	ACTION[1]	STYLE		
		Design V100	*ēdisc* Valves	Butterfly Valves[2]
Right-hand	PDTC	A	B	B
	PDTO	B	A	A
Left-hand	PDTC	C	C	C
	PDTO	D	D	D

1. PDTC—Push-down-to-close; PDTO—Push-down-to-open.
2. 7600, 7800, and 9500 Series valves.

Figure 3. Mounting Styles and Positions for Type 1051 and 1052 Actuators

b. If a manual handwheel actuator is to be used, refer to the separate handwheel actuator instruction manual for mounting instructions.

14. Replace the cover (key 33), and secure with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If the hole alignment cannot be obtained in this manner, temporarily loosen the cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.

1. Trademark of Loctite Corp.

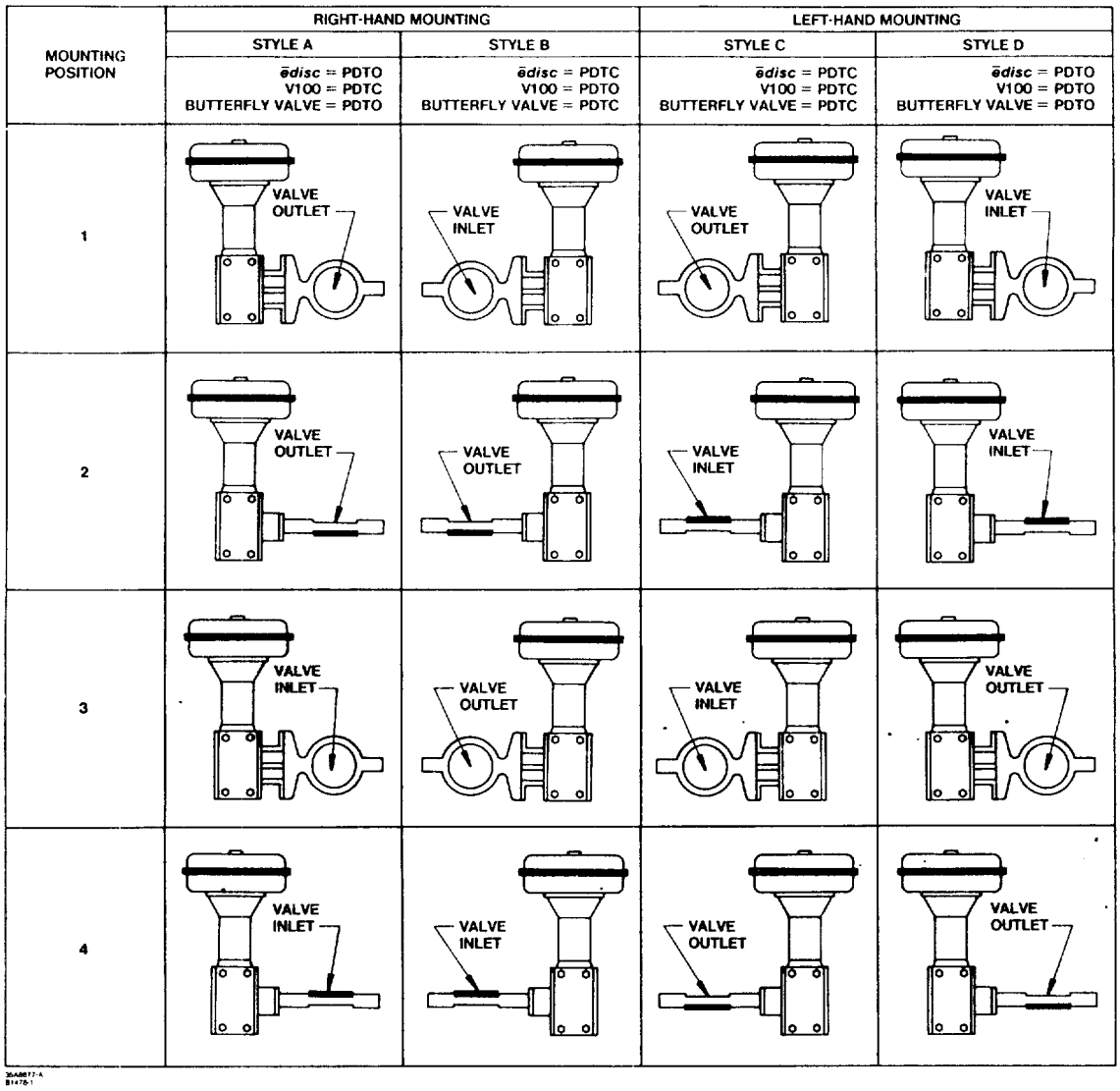


Figure 4. Actuator-Valve Mounting

15. Follow the instructions given in the Adjustment section for correct actuator turnbuckle adjustment before proceeding to the Loading Connection portion of this section.

Loading Connection

1. Connect the loading pressure piping to the pressure connection in the top of the diaphragm casing.

For size 30 through 60 actuators, run either 1/4-inch pipe or 3/8-inch tubing between the 1/4-inch pressure connection and the instrument.

For size 70 actuators, run either pipe or tubing between the pressure connection and the instrument. If necessary, remove the 1/4-inch bushing in the pressure connection to increase connection size.

2. Keep the length of pipe or tubing as short as possible to avoid transmission lag in the control signal. If an accessory (such as a volume booster or a valve positioner) is used, be sure that the accessory is properly connected to the actuator. If a valve positioner is part of the assembly, the pressure connection to the actuator will normally be made at the factory.

3. When the control valve is completely installed and connected to the instrument, check for correct action (air-to-open or air-to-close) to match the controlling instrument. For successful operation, the actuator stem and valve shaft must move freely in response to the loading pressure change on the diaphragm.

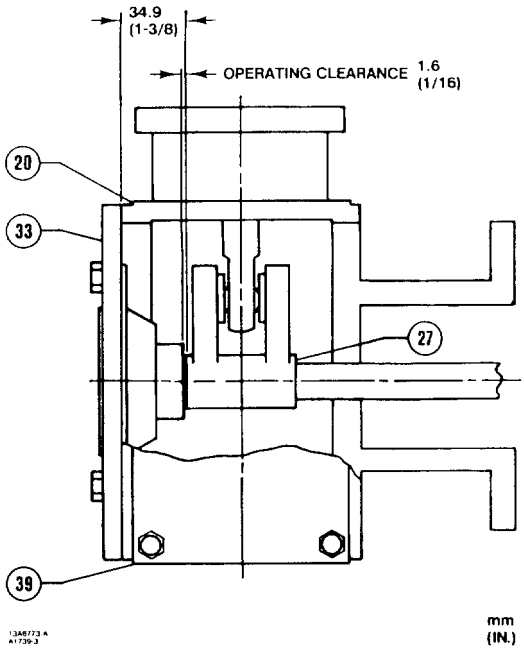


Figure 5. Lever Operating Clearance

Adjustment

WARNING

Avoid personal injury or damage to property from sudden release of process fluid. Before starting adjustment:

- **Isolate the valve from the process,**
- **Release process pressure, and**
- **Vent the actuator loading pressure.**

Type 1051 and 1052 Turnbuckle Adjustment

Correct turnbuckle adjustment ensures that the valve is correctly closed when the actuator is against its travel stops. The turnbuckle adjustment is the only adjustment necessary on the Type 1051 actuator. Key numbers used in this procedure are shown in figure 7 for Type 1051 actuators and in figure 8 for Type 1052 actuators.

For accurate adjustment to the zero-degree valve disk or ball position, remove valve from pipeline. Refer to the valve body instruction manual for instructions.

A regulated air supply will be required to stroke the actuator. Consult table 4 for the sizes of the three open-end wrenches required for this procedure.

Table 4. Wrench Sizes Required for Turnbuckle Adjustment, In.

ACTUATOR		TURN-BUCKLE (KEY 57)	LOWER LOCKNUT (KEY 16)	UPPER LOCKNUT (KEY 58)
Type	Size			
1051 & 1052	30	15/16	1/2	7/8
	40	1-1/8	3/4	1-1/8
	60	1-5/16	15/16	1-5/16
1052	70	1-5/16	1-1/8	1-5/16

1. Remove the access plate (key 59). Also remove the machine screws (key 60), if present.

Note

For the most accurate adjustment of the actuator, do not remove cover (key 33) during this procedure.

2. Loosen the lower locknut (key 16).

3. Make sure the actuator housing (key 20) is clear of any tools or other instruments that could obstruct the actuator stroke path. Pressure diaphragm casing enough to stroke the actuator down so that the left-hand threaded upper locknut (key 58) is accessible through the access opening. Loosen the locknut.

4. Use one of the following:

a. **Push-down-to-close**—Slowly stroke the actuator to the down travel stop. Consult the appropriate valve body instruction manual for determining the closed position of the valve. Adjust the turnbuckle (key 57) until the valve is in the closed position. Lock this adjustment with the left-hand threaded locknut (key 58). Stroke the actuator to the mid-travel position, and tighten the locknut (key 16).

b. **Push-down-to-open**—Consult the appropriate valve body instruction manual for determining the closed position. Release all pressure from the diaphragm casing, making sure the diaphragm is against its up travel stop. Be sure that the optional handwheel is adjusted to its topmost position so that the zero position of the actuator and valve can be reached simultaneously. Check the valve position. Stroke the actuator so the turnbuckle (key 57) is accessible through the access opening. Adjust the linkage. Release pressure to the actuator, and check the new adjustment. Continue this procedure until the valve is in the closed position when the actuator is resting on its up travel stop. Tighten locknut (key 16). Stroke the actuator, and tighten left-hand threaded locknut (key 58).

5. Replace the access plate (key 59).

6. Loosen the self-tapping screws (key 38), and adjust the travel indicator (key 37). Retighten the self-tapping screws.

Type 1052 Spring Adjustment

Initial Compression

The Type 1052 nameplate (figure 2) specifies a spring set, which is the initial compression adjusted into the actuator spring. Initial compression is the casing pressure at which the diaphragm and diaphragm rod begin to move away from the up travel stop with the actuator disconnected from the valve. (With the actuator connected to the valve and pressure applied to the valve, a higher pressure will be required to start actuator travel). The intial compression was selected (based upon the service conditions specified when the actuator was ordered) so that, when the actuator and valve are in service, the valve will seat properly and full travel will be obtained within a diaphragm casing range of 0 to 18, 0 to 33, 0 to 40, or 0 to 55 psig (0 to 1.2, 0 to 2.3, 0 to 2.8, or 0 to 3.8 bar) depending on specific actuator size and construction.

If the actuator has been disassembled or if the spring adjustment was changed, and it is desired to match the initial compression stated on the nameplate, make sure the rod end bearing (key 17, figure 8) has been disconnected from the lever (key 27, figure 8). Adjust the spring so that the diaphragm rod just starts to travel at the spring set pressure specified on the nameplate. Be sure the rod end bearing does not hit the lever as the diaphragm and diaphragm rod move away from the up travel stop. To adjust the spring, insert a round rod into one of the holes in the lower bearing seat (key 73, figure 8). Hole diameter is 3/8-inch (9.5 mm) for size 30 and 40 actuators, 5/8-inch (15.9 mm) for size 60 actuators, and 3/4-inch (19.1 mm) for size 70 actuators. Rotate the bearing seat to move it toward the casings (keys 1 and 2, figure 8) to increase initial compression or away from the casings to decrease initial compression.

Stroking Range

The initial spring set listed on the nameplate has been determined to be the optimum setting, and it is not recommended to make spring adjustments that will cause this value to change or be exceeded. For push-down-to-open valve action, the initial spring set is the maximum allowable to provide the maximum spring closing force. Any increase of this setting will overstress the spring at full travel. For push-down-to-close valve action, the initial spring set has been determined to be the optimum balance between the air to close and the spring to open breakout torque.

If the Type 1052 actuator is to be changed from one valve action to another (i.e., push-down-to-close to push-down-to-open), first, refer to the initial spring compression values listed in the parts list table (key 11) of this manual to determine the proper initial spring setting; then, adjust the unit according to the procedures in the Initial Compression portion of the Type 1052 Spring Adjustment section.

Principle of Operation

The diaphragm rod moves down as loading pressure is increased on top of the diaphragm. As the loading pressure is decreased, the spring forces the diaphragm rod upward.

The spring and diaphragm have been selected to meet the requirements of the application and, in service, the actuator should produce full travel of the valve with the diaphragm pressure as indicated on the nameplate (shown in figure 2).

Consult the separate positioner instruction manual for actuator principle of operation with positioner.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. Instructions are given below for adjustment, disassembly, and assembly of parts. Key numbers referenced in the following steps are shown in figure 7 for Type 1051 actuators and in figure 8 for Type 1052 actuators.

WARNING

Avoid personal injury or property damage from sudden release of pressure or uncontrolled process fluid. Before starting disassemly:

- **Isolate the valve from the process,**
- **Release process pressure, and**
- **Vent the actuator loading pressure.**

Disassembly

The following procedure describes how the actuator can be completely disassembled. When inspection or repairs are required, perform only those steps necessary to accomplish the procedure. Do not under ordinary circumstances remove the cap screws (keys 7, 8, and 21).

CAUTION

Cap screw (key 18) must be disengaged from the lever (key 27) before removing the diaphragm casing (key 1). Failure to do so will allow the spring precompression to rotate the valve beyond its fully open or closed position. This could cause damage to the valve seal.

1. Bypass the control valve. Relieve all loading pressure, and remove the tubing or pipe from the top of the actuator.

2. Remove the positioner, if one is used.

3. Unscrew the cap screws and washers (keys 34 and 63), and remove the cover (key 33).

4. Remove the retaining ring (key 30), and then remove the hub (key 29) from the cover.

5. Check the condition of the bushing (key 31). If replacement of the bushing is necessary, the travel indicator scale (key 35) must be removed by unscrewing the self-tapping screws (key 36).

6. Remove the cap screw and hex nut (keys 18 and 19).

7. Make note of the lever/valve shaft orientation, and then loosen the cap screw (key 28).

CAUTION

Do not use a hammer or similar tool to drive the lever (key 27) off the valve shaft. On some valve types, driving the lever could move the valve disk and bearings away from the centered position. This could cause damage to valve parts as the valve is being operated.

If necessary, use a wheel puller to remove the lever. It is permissible to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could also damage valve parts or disrupt the centered position of the valve disk and bearings.

8. Rotate the handwheel (if one is used) counterclockwise until the handwheel is not compressing the spring (key 11).

WARNING

To avoid personal injury from precompressed spring force suddenly thrusting the upper diaphragm casing (key 1) away from the actuator, relieve Type 1052 spring compression, or carefully remove Type 1051 casing cap screws by following the instructions presented in the next two steps before proceeding further.

9. To relieve Type 1052 spring compression, insert a round rod into one of the holes in the lower bearing seat (key 73). Hole diameter is 3/8 inch (9.5 mm) for size 30 and 40 actuators, 5/8 inch (15.9 mm) for size 60 actuators, and 3/4 inch (19.1 mm) for size 70 actuators. Use the rod to rotate the lower bearing seat, and move it away from the actuator casings. Continue rotating the lower bearing seat until spring compression is completely removed.

10. Loosen, but do not remove, all casing cap screws (key 5). Make sure there is no spring force on the Type 1051 upper diaphragm casing. Unscrew and remove the cap screws and hex nuts (keys 5 and 6), and then remove the upper diaphragm casing and the diaphragm (key 3).

11. Proceed as appropriate:

For Type 1051 actuators,

a. Read and follow the warning printed on the nameplate (key 56) located on the diaphragm plate (key 4).

b. Pull the diaphragm plate (key 4) and attached parts out of the actuator. The spring (key 11), diaphragm rod (key 10), cap screw (key 9), spring seat (key 13), hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) will be attached to the diaphragm head.

WARNING

For Type 1051 actuators, the diaphragm plate (key 4) may be wedged against the diaphragm rod (key 10), thereby preventing the spring compression from being relieved as the cap screw (key 9) is loosened. Dislodge the diaphragm head from the diaphragm rod by loosening the cap screw (key 9) one full turn and tapping the underside of the diaphragm head until it follows the cap screw disassembly. Failure to check for this situation before removing the cap screw (key 9) could cause personal injury due to the sudden release of spring compression as the cap screw is disengaged.

c. Slowly remove the cap screw (key 9) while making sure that the diaphragm head is following the cap screw disassembly. Note that spring load will be zero before the cap screw is completely removed. Then separate the remaining parts of the assembly.

For Type 1052 actuators,

a. Remove the hex nut (key 16), the turnbuckle (key 57), and the hex nut (key 58) from the diaphragm rod (key 10).

b. Pull the diaphragm plate (key 4) and attached parts out of the actuator. Then remove the cap screw (key 9) to separate the diaphragm plate and the diaphragm rod.

c. Proceed as appropriate:

- For actuator designs without a set screw in the spring barrel (key 12), remove the actuator spring (key 11) from the actuator. If it is necessary to remove the adjustor (key 74) from the spring barrel during this procedure, heat the base of the adjustor to 350°F (177°C) long enough for the Loctite 271 thread-locking compound (key 77) to lose its holding strength. Then, unscrew the adjustor from the spring barrel. If the spring seat and the lower bearing seat (keys 13 and 73) are to be replaced, unscrew the lower bearing seat from the adjustor, and then remove the thrust bearing and the bearing races (keys 71 and 72) from the lower bearing seat.

- For actuator designs with a set screw (key 75), remove the actuator spring (key 11) from the actuator. If it is necessary to remove the spring adjustment parts, loosen the set screw (key 75), and unscrew the spring adjustor (key 74) from the spring barrel (key 12).

12. Unscrew the cap screws (key 23), and remove the actuator housing assembly (key 20).

13. Unbolt the mounting yoke (key 22) from the valve body.

14. Check the bushing (key 67) in the mounting yoke. Press out and replace the bushing if necessary.

Assembly

This procedure assumes that the actuator was completely disassembled. If the actuator was not completely disassembled, start these instructions at the appropriate step. Key numbers used are shown in figure 7 for Type 1051 actuators and in figure 8 for Type 1052 actuators.

1. If the Type 1052 spring barrel (key 12) was removed from the housing (key 20), align the spring barrel to the housing as described below to ensure that the offset hole in the base of the spring barrel will be located properly.

For size 30 actuators, note the accessory mounting bosses on opposite sides of the spring barrel. Place the spring barrel on the housing with one of the spring barrel bosses on the same side as the boss located on the housing (see figure 8). Check to be sure that the threaded hole in the base of the spring barrel is offset toward the positioner, or toward the cover plate (key 39) if no positioner is used. The hole is offset 7/8-inch (22 mm) from the center of bolt circle of the four mounting holes in the base of the spring barrel. If the direction of offset is incorrect, rotate the spring barrel 180 degrees. Secure with the cap screws (key 21).

For Size 40 and 60 actuators, note that one of the accessory mounting bosses on the spring barrel is closer to the diaphragm end of the spring barrel. Place the spring barrel on the housing with the upper boss (the one closer to the diaphragm end) on the same side as the boss located on the housing (see figure 8). This will ensure proper positioning of the offset hole. Secure the spring barrel with cap screws (key 21).

For size 70 actuators, the spring barrel need not be aligned in any particular position when placing it on the housing.

Note

Replacement mounting yokes (key 22) for use with *ēdisc* and Design V100 valves are available only as assemblies that also include the bushing (key 67). However, replacement bushings are also available separately (see the parts list; keys 22 and 67).

2. If the bushing (key 67) was removed, press in the new bushing. The end of the bushing should be flush with the bottom of the recess in the mounting yoke (key 22).

3. Slide the mounting yoke (key 22) over the valve shaft, and secure it to the valve with the valve mounting cap screws. For butterfly valves, use a bolting torque of 30 foot-pounds (41 newton•meters) for 1/2 through 1-inch (12.7 through 25.4 mm) diameter valve shafts and 100 foot-pounds (135 newton•meters) for 1-1/4 and 1-1/2 inch (31.8 and 38.1 mm) diameter valve shafts. For other valve types, refer to the appropriate valve body instruction manual for bolting torques for these cap screws.

CAUTION

Refer to table 3 for bolting torques for actuator bolts and cap screws. Exceeding any torque requirement may impair the safe operation of the actuator.

4. Refer to figures 3 and 4 for the desired orientation of the housing (key 20). Secure the housing to the yoke with cap screws (key 23).

5. Proceed as appropriate:

For Type 1051 actuators,

a. Coat the thread of the cap screw (key 9) and the tapered end of the diaphragm rod (key 10) with Lubriplate[1] MAG-1 or equivalent lubricant.

b. Assemble the diaphragm rod, spring seat (key 13), spring (key 11), and diaphragm plate (key 4), and secure with the cap screw (key 9). Tightening the cap screw will compress the spring. Be certain the tapered end of the diaphragm rod is seated in the corresponding hole in the diaphragm plate, that the spring is seated in the spring seat, and that the cap screw is tightened to the torque specified in table 3.

c. Install the hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) onto the diaphragm rod.

d. Be certain the travel stops (key 8) are located as shown in figure 6.

e. Install the diaphragm plate and attached parts into the actuator.

f. Be sure the warning nameplate (key 56) is in place. Install the diaphragm (key 3) and the upper diaphragm casing (key 1). Install the cap screws and hex nuts (keys 5 and 6). Tighten the cap screws evenly in a crisscross pattern to compress the spring and secure the upper diaphragm casing.

For Type 1052 actuators,

a. Proceed as appropriate:

- For actuator designs without a set screw in the spring barrel (key 12), if the adjustor and attached parts were removed, first clean and then lubricate the upper threads of the adjustor (key 12) with Lubriplate MAG-1 or equivalent lubricant (key 76) as shown in figure 8. Install the lower bearing seat (key 73), the thrust bearing (key 71), the thrust bearing races (key 72), and the spring seat (key 13) onto the adjustor. Then, first clean and then coat the lower end of the adjustor with Loctite 271 or equivalent thread-locking compound (key 77) as shown in figure 8, and install the entire assembly into the spring barrel (key 12). Let the adjustor stand undisturbed for at least two hours after installation to allow the thread-locking compound to cure.

CAUTION

When applying lubricant to the upper threads and thread-locking compound to the lower threads of the adjustor, do not overlap the coat of lubricant with the coat of thread-locking compound since this will adversely affect the performance quality of both substances.

- For actuator designs with a set screw (key 75), if the adjustor (key 74) and attached parts were removed, lubricate the threads of the adjustor with Lubriplate MAG-1 or equivalent lubricant (key 76). Install the lower bearing seat (key 73), the thrust bearing (key 71), the thrust bearing races (key 72), and the spring seat (key 13) onto the adjustor. Install this assembly into the spring barrel (key 12). Secure the adjustor with the set screw (key 75).

b. Coat the tapered end of the diaphragm rod (key 10) and the threads of the cap screw (key 9) with Lubriplate MAG-1 or equivalent lubricant (key 76). Bolt the diaphragm plate to the diaphragm rod.

c. Be certain the travel stops (key 8) are located as shown in figure 6.

d. Install the spring (key 11) into the spring barrel. Install the diaphragm plate and diaphragm rod into the actuator. Attach the hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) to the diaphragm rod.

e. Install the diaphragm (key 3).

f. Place the upper diaphragm casing (key 1) on the lower diaphragm casing (key 2). If necessary, rotate the lower bearing seat (key 73) so that the upper diaphragm casing travel stop will not contact the diaphragm when the casing cap screws (key 5) are tightened. Secure the upper diaphragm casing with the cap screws and hex nuts (keys 5 and 6). Be sure the warning nameplate is in place on the casing.

6. For Type 1052 actuators, complete the Initial Compression portion of the Adjustment section before proceeding.

7. Consult the appropriate valve body instruction manual for lever/valve shaft orientation marks, and slide the lever (key 27) into place; see figure 5 for correct lever operating clearance. Clamp with the cap screw (key 28).

8. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by stroking the actuator off its up travel stop with a regulated air source.

9. Apply Loctite 271 or equivalent thread-locking compound (key 77) to the threads of the cap screw (key 18).

1. Trademark of Fiske Brothers Refining Co.

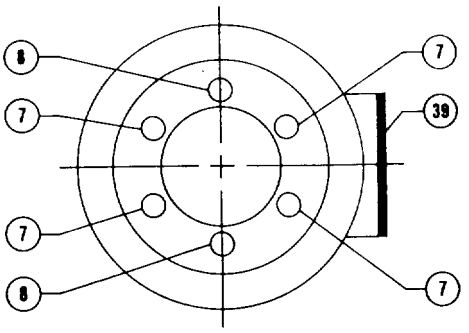


Figure 6. Travel Stop Orientation

10. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten the cap screw to the torque recommended in table 3.

11. If a valve positioner is to be used, consult the separate valve positioner instruction manual for proper positioner installation.

12. Coat the bearing surfaces of the hub (key 29), and cover (key 33) with Lubriplate MAG-1 or equivalent lubricant (key 76). Install the bushing (key 31) and hub into the cover. Secure with the retaining ring (key 30).

13. Install the travel indicator scale (key 35), and secure it with the self-tapping screws (key 36). Then install the travel indicator (key 37), and secure it with the self-tapping screws (key 38).

14. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly. Replace the cover (key 33), and secure with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If hole alignment cannot be obtained in this manner, temporarily loosen cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.

15. Follow the instructions in the Adjustment section for correct actuator turnbuckle adjustment.

Changing Actuator Mounting

The actuator is normally positioned vertically in a horizontal pipeline. However, there are four possible mounting styles and four possible positions for each style. See figures 3 and 4.

Note

Due to its weight, the Type 1052, size 70 actuator must be externally supported if mounted in the horizontal position.

Correct lever/valve shaft positioning is important to ensure proper valve action. Consult the appropriate valve body instruction manual.

WARNING

Avoid personal injury or damage to property from sudden release of pressure or uncontrolled process fluid. Before starting disassembly:

- **Isolate the valve from the process,**
- **Release process pressure, and**
- **Vent the actuator loading pressure.**

Style A is right-hand mounted, while style D is left-hand mounted. In all other ways, the styles A and D are identical.

Style B is right-hand mounted, while style C is left-hand mounted. In all other ways, the styles B and C are identical.

Use the following procedure along with figures 7 and 8, for key number references, to convert from styles A and D to styles B and C or vice versa or to change the mounting position.

1. Remove the cover (key 33) by unscrewing and removing the cap screws and washers (keys 34 and 63).

2. Unscrew cap screw (key 18). Loosen cap screw (key 28).

CAUTION

When removing lever (key 27), do not use a hammer or similar tool to drive the lever off the valve shaft. Driving the lever could damage internal valve parts. On some valve types, driving the lever could move the valve disk and bearings away from the centered position, causing subsequent damage to valve parts as the valve is operated.

If necessary, use a wheel puller to remove the lever. It is permissible to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could also damage valve parts or disrupt the centered position of valve disk and bearings.

3. If changing styles,

a. Unscrew cap screws (key 23), and remove the actuator housing (key 20) from the mounting yoke (key 22).

b. Rotate the housing 180 degrees, maintaining the appropriate position (1, 2, 3, or 4), and place the actuator onto the mounting yoke (key 22).

4. If changing positions, unscrew cap screws (key 23), and rotate the actuator housing to the desired position.

Note

Consult table 3 for appropriate bolt torques.

5. Secure actuator housing (key 20) to the mounting yoke (key 22) with cap screws (key 23).

6. Consult the appropriate valve body instruction manual for lever/valve shaft orientation marks, and slide the lever (key 27) into place; see figure 5 for correct lever operating clearance. Clamp with the cap screw (key 28).

7. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by stroking the actuator off its up travel stop with a regulated air source.

8. Apply Loctite 271 or equivalent thread-locking compound (key 77) to the threads of the cap screw (key 18).

9. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). This connection can be aided by stroking the actuator from its up travel stop with a regulated air source.

Note

Tighten cap screw (key 18) to the recommended bolt torque shown in table 3.

10. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly. Replace the cover (key 33), and secure it with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If hole alignment cannot be obtained in this manner, temporarily loosen cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.

11. Follow the instructions given in the Adjustment section for correct actuator turnbuckle adjustment.

Top-Mounted Handwheels and Adjustable Travel Stops

Principle of Operation

Note

If repeated or daily manual operation is expected or desired, the unit should be equipped with a manual handwheel actuator. Refer to the separate manual handwheel actuator instruction manual for mounting instructions.

The top-mounted handwheel assembly is attached to a special upper diaphragm casing (key 1, figures 7 and 8) with cap screws (key 141, figure 9). A hex nut (key 137, figure 9) locks the handwheel in position.

Turning the handwheel (key 51, figure 9) clockwise into the upper diaphragm casing forces the pusher (key 135, figure 9) against the diaphragm and diaphragm plate (keys 3 and 4, figures 7 and 8) to compress the spring (key 11, figures 7 and 8) and move the diaphragm rod downward. Turning the handwheel counterclockwise allows the actuator spring to move the diaphragm rod upward. If the valve is push-down-to-close, full opening can be restricted by positioning the handwheel at the desired position. If the valve is push-down-to-open, full closing of the valve can be restricted by use of the handwheel.

The adjustable up travel stop (figure 10) limits the actuator stroke in the upward direction. To make adjustments, first relieve actuator loading pressure before removing the closing cap (key 187) as it is a pressure retaining part. Also, for size 70 actuators, the hex nut (key 137) must be loosened. Then turn the stem (key 133)

clockwise into the diaphragm case to move the actuator stem downward or counterclockwise to allow the spring to move the actuator stem upward. If the valve has push-down-to-close action, full opening can be restricted; or on a push-down-to-open valve, full closing can be restricted by the position of the adjustable travel stop. Tighten the hex nut (for size 70), and replace the closing cap after adjustment.

The adjustable down travel stop (figure 11) limits the actuator stroke in the downward direction. To make adjustments, first relieve actuator loading pressure before removing the closing cap (key 187) as it is a pressure retaining part. After removing the closing cap, loosen the hex jam nut (key 189) and either turn the hex nut (key 63 for size 30, 40, and 70 actuators; or key 54 for size 60 actuators) down on the stem (key 133) to limit travel, or up on the stem to allow more travel. Lock the jam nut against the hex nut, and replace the closing cap after the adjustment has been made.

Maintenance

WARNING

Avoid personal injury or damage to property from sudden release of pressure or uncontrolled process fluid. Before starting disassembly:

- **Isolate the valve from the process,**
- **Release process pressure, and**
- **Vent the actuator loading pressure.**

If loading pressure seems to be leaking from either the handwheel or adjustable up stop, the O-rings (key 138 and 139, figures 9 and 10) may need replacement. If the adjustable down stop leaks, the O-ring (key 139, figure 11) may need replacement or possibly the closing cap (key 187, figure 11) is not tight. To tighten the closing cap, apply a good grade of thread sealant to the closing cap threads.

For ease of operation, the stem (key 133, figures 9, 10, and 11) threads may need an occasional application of Lubriplate MAG-1 or equivalent lubricant. A grease fitting (key 169, figures 9 and 10) is provided for this purpose in the size 70. The size 70 may also need to have the thrust bearing (key 175, figures 9 and 10) packed with Lubriplate MAG-1 or equivalent. Travel stops for the smaller castings can be lubricated between the stem and pusher (key 135, figures 9 and 10) with Lubriplate MAG-1 or equivalent.

The following disassembly procedures are separated where appropriate between the top-mounted handwheel and adjustable up travel stop assemblies (figures 9 and 10) and the adjustable down travel stop assembly (figure 11).

1. Bypass the control valve, reduce loading pressure to atmospheric, and remove the tubing or pipe from the body (key 142, figures 9, 10, and 11).

WARNING

To avoid personal injury from the precompressed spring force thrusting the upper diaphragm casing (key 1, figures 7 and 8) away from the actuator, either relieve Type 1052 spring compression, or carefully remove Type 1051 casing cap screws by following the instructions that are referenced in the steps below before removing the casing.

2. Relieve all actuator spring compression by following the procedures presented in the disassembly portion of the actuator maintenance section. Then, rotate either the handwheel (key 51, figure 9) or the travel stop stem (key 133, figures 10 and 11) counterclockwise until the handwheel or travel stop assembly is no longer compressing the spring.

CAUTION

For Type 1051 actuators with *ēdisc* valves and push-down-to-open action, the cap screw (key 18, figure 7) should be disengaged from the lever (key 27, figure 7) before removing the diaphragm casing (key 1, figure 7) as specified in the following steps. Failure to do so will allow the spring precompression to rotate the valve beyond its closed position. This could cause damage to the valve seal.

3. Proceed as appropriate:

For Top-Mounted Handwheel and Adjustable Up Travel Stops.

a. Remove the upper diaphragm casing (key 1, figures 7 and 8) by following steps 1, 3, 7, 9, 10, and 11 of the Disassembly portion of the Actuator maintenance section.

b. Remove the cap screws (key 141, figures 9 and 10), and separate the assembly from the upper casing.

c. Loosen the locknut (key 137, figure 9), or remove the closing cap (key 187, figure 10).

d. Turn the stem (key 133, figures 9 and 10) clockwise out of the body. On handwheel assemblies, the hex nut and washer (keys 54 and 134, figure 9) will have to be removed so that the handwheel (key 51, figure 9) and locknut can be taken off the stem first.

e. Remove and inspect the O-rings (keys 138 and 139, figures 9 and 10); replace them if necessary.

f. To complete disassembly for sizes 30, 40, and 60, drive out the groove pin (key 140, figures 9 and 10), and slide the pusher (key 135, figures 9 and 10) off the stem. The pusher of a size 70 unit is held to the stem by a retaining screw (key 174, figures 9 and 10). Removing the retaining screw and pusher exposes the thrust bearing (key 175, figures 9 and 10) for inspection.

For Adjustable Down Travel Stops.

Refer to figure 11 for appropriate key numbers unless otherwise stated.

a. Remove the closing cap (key 187), and unscrew the jam nut and hex nut (keys 189 and 63 for size 30, 40, and 70 actuators; or keys 189 and 54 for size 60 actuators) off the stem (key 133).

b. Remove the upper diaphragm casing (key 1, figures 7 and 8) and travel stop body (key 142) by following steps 1, 3, 7, 9, 10, and 11 of the Disassembly portion of the Actuator maintenance section.

c. Unscrew cap screws (key 141), and remove the body from the diaphragm case.

d. Check the condition of the O-ring (key 139), and replace it if necessary.

e. Loosen the hex nut (key 54), and then unscrew the travel stop stem (key 133) out of the actuator stem. The lower diaphragm plate (key 82) can now be removed and the rest of the actuator disassembled.

4. Reassemble in the reverse order of the disassembly steps being sure to apply lubricant as previously mentioned and as shown by the lubrication boxes (key 241) in figures 9 and 10. For size 70 handwheels or up travel stop assemblies, coat the threads of the retaining screws (key 174, figures 9 and 10) with Loctite 271 or equivalent thread-locking compound (key 242).

5. Readjust the spring to obtain the appropriate travel stop restriction by following the procedures presented in the introductory portion of this section, and then return the unit to operation.

Parts Ordering

When corresponding with your Fisher sales office or sales representative about this equipment, refer to the serial number found on the actuator nameplate (figure 2 and key 41, figures 7 and 8). Also, specify the complete 11-character part number from the following parts list when ordering replacement parts.

Parts List

Type 1051 & 1052 Actuators

Key	Description	Part Number
1	Upper Diaphragm Casing, zn pl steel	
	W/o handwheel	
	Size 30	2J7138 28992
	Size 40	2L4418 28992
	Size 60	30A0055 X012
	Size 70	2N1266 28992
	W/handwheel, w/adjustable up travel stop or w/adjustable down travel stop	
	Size 30	2E7922 25062
	Size 40	2E8063 25062
	Size 60	2E8474 25062
	Size 70	2N1310 25062
2	Lower Diaphragm Casing, zn pl steel	
	Size 30	2E7922 25062
	Size 40	2E8063 25062
	Size 60	2E8474 25062
	Size 70	2N1271 25062
3*	Diaphragm	
	W/ or w/o handwheel or w/adjustable up travel stop	
	Nitrile (standard)	
	Size 30	2E7919 02202
	Size 40	2E6700 02202
	Size 60	2E8597 02202
	Size 70	2N1269 02202
	Silicone	
	Size 30	2E7919 X0022
	Size 40	2E6700 X0012
	Size 60	2E8597 X0032
	Size 70	2N1269 X0012
	W/adjustable down travel stop	
	Nitrile (standard)	
	Size 30	2E8000 02202
	Size 40	2E6699 02202
	Size 60	2E8598 02202
	Size 70	2N1309 02202
	Silicone	
	Size 30	2E8000 X0022
	Size 40	2E6699 X0042
	Size 60	2E8598 X0012
	Size 70	2N1309 X0012
4	Diaphragm Plate, cast iron	
	Size 30	2F6493 19042
	Size 40	2V9399 19042
	Size 60	20A1336 X012
	Size 70	2N1270 19042
5	Cap Screw, pl steel	
	Size 30 (12 req'd)	1A6751 24052
	Size 40 (16 req'd)	1A6751 24052
	Size 60 (24 req'd)	1A6751 24052
	Size 70 (28 req'd)	1A5828 24052
6	Hex Nut, zn pl steel	
	Size 30 (12 req'd)	1A3465 24122
	Size 40 (16 req'd)	1A3465 24122
	Size 60 (24 req'd)	1A3465 24122
	Size 70 (28 req'd)	1A3465 24122
7	Cap Screw, pl steel	
	Sizes 30 & 40 (4 req'd)	1A3684 24052
	Size 60 (6 req'd)	1A3684 24052
	Size 70 (10 req'd)	1N1293 28992

*Recommended spare part

Key	Description	Part Number
8	Travel Stop, steel (2 req'd)	
	Size 30	
	60 degree rotation	1F5367 24092
	90 degree rotation	15A8382 X012
	Size 40	
	60 degree rotation	1E8067 24092
	90 degree rotation	1H5917 24092
	Size 60	
	60 rotation	16A6535 X012
	75 degree rotation (Type 1052 only)	16A7829 X012
	90 degree rotation	16A4120 X012
	Size 70	
	60 degree rotation	16A9183 X012
	75 degree rotation	16A5631 X012
	90 degree rotation	1P4066 24092
9	Cap Screw, steel (not req'd w/adjustable down travel stop)	
	Type 1051	
	Size 30	12A9459 X012
	Size 40	12A9460 X012
	Size 60	12A9461 X012
	Type 1052	
	Sizes 30 & 40	1E7604 32992
	Sizes 60 & 70	1E7754 32982
10	Diaphragm Rod, pl steel	
	Type 1051	
	Size 30	12A9652 X042
	Size 40	12A9652 X022
	Size 60	12A9652 X032
	Type 1052	
	Size 30	25A6967 X012
	Size 40	25A6968 X012
	Size 60	25A6969 X012
	Size 70	26A9173 X012
11	Spring	See following tables
12	Spring Barrel	
	Type 1051	
	Aluminum	
	Size 40	32A9325 X012
	Size 60	42A9327 X012
	Cast iron	
	Size 40	32A9325 X022
	Size 60	42A9327 X022
	Type 1052	
	Aluminum	
	Size 30	37A6619 X022
	Size 40	48A2485 X022
	Size 60	48A2484 X022
	Cast iron	
	Size 30	37A6619 X012
	Size 40	48A2485 X012
	Size 60	48A2484 X012
	Size 70	46A9171 X012
13	Spring Seat	
	Type 1051, steel	See following table
	Type 1052, zn pl steel	
	Size 30	18A2472 X012
	Size 40	18A2483 X012
	Size 60	18A2477 X012
	Size 70	16A9174 X012
16	Hex Nut, zn pl steel	
	Size 30	1A9463 24122
	Size 40	1A3537 24122
	Size 60	1A3540 24122
	Size 70	1A3511 24122
17	Rod End Bearing, steel/TFE	
	Size 30	1R5802 99012
	Size 40	1E5616 99012
	Size 60	1R4408 99012
	Size 70	1R5876 99012

Key	Description	Part Number
18	Cap Screw, pl steel	
	Size 30	1A5534 24052
	Size 40	1A3615 24052
	Size 60	12A9519 X012
	Size 70	12A9458 X012
19	Hex Nut, pl steel	
	Size 30	1A3527 24122
	Size 40	1A3412 24122
	Size 60	1A3433 24122
	Size 70	1A5993 24122
20	Housing	
	Aluminum	
	Size 30	
	Type 1051	46A0463 X022
	Type 1052	42A9306 X062
	Size 40	42A9306 X062
	Sizes 60 & 70	42A9309 X062
	Cast iron	
	Size 30	
	Type 1051	48A5247 X012
	Type 1052	48A5245 X012
	Size 40	48A5245 X012
	Sizes 60 & 70	48A5246 X012
21	Cap Screw, pl steel (4 req'd)	
	Size 30	
	(Type 1052 only)	1A3526 24052
	Size 40	1A3526 24052
	Sizes 60 & 70	1A4186 24052
22	Mounting Yoke	See following table
23	Cap Screw, pl steel (4 req'd)	
	Sizes 30 & 40	1A3369 24052
	Sizes 60 & 70	1A3409 24052
27	Lever, ductile iron	See following table
28	Cap Screw, pl steel	
	Size 30	1A3531 24052
	Size 40	1A3409 24052
	Size 60	12A9405 X012
	Size 70	1A4302 24052
29	Hub	See following table
30	Retaining Ring, zn pl steel	
	Sizes 30 & 40	12A9409 X012
	Sizes 60 & 70	12A9455 X012
31	Bushing, fiberglass	
	Sizes 30 & 40	12A9373 X012
	Sizes 60 & 70	12A9374 X012
33	Cover	
	Aluminum	
	Sizes 30 & 40	32A9533 X012
	Sizes 60 & 70	32A9532 X012
	Cast iron	
	Sizes 30 & 40	32A9311 X012
	Sizes 60 & 70	32A9313 X012
34	Cap Screw, zn pl steel	
	W/o handwheel	
	Use w/o switches or w/Micro Switches[1] BZE6-2RN, DTE6-2RN, OP-AR, OPD-AR, EX-AR, & EXD-AR (4 req'd)	
	Sizes 30 & 40	1A3369 24052
	Sizes 60 & 70	1A3409 24052
	Use w/NAMCO[2] limit switches or W/Micro Switches LSA or LSX	
	One Switch	
	Sizes 30 & 40	
	2 req'd	1A7820 24052
	2 req'd	1A3369 24052
	Sizes 60 & 70	
	2 req'd	18A8737 X012
	2 req'd	1A3409 24052

Key	Description	Part Number
34	Cap Screw (Continued)	
	Two Switches (4 req'd)	
	Sizes 30 & 40	1A7820 24052
	Sizes 60 & 70	18A8737 X012
	Use w/Types 304 & 3552 (4 req'd)	
	Sizes 30 & 40	1C4038 24052
	Sizes 60 & 70	1A4533 24052
	Use w/GO[3] - 713760 switch (3 req'd for one switch; 2 req'd for two switches)	
	Sizes 30 & 40	1A3369 24052
	Sizes 60 & 70	1A3409 24052
	W/Type 1076 handwheel	
	Use w/o switches or w/Micro switches BZE6-2RN, DTE6-2RN, OP-AR, OPD-AR, EX-AR & EXD-AR (4 req'd)	
	Sizes 30 & 40	1A3369 24052
	Sizes 60 & 70	1A3409 24052
	Use w/NAMCO switches or w/Micro switches LSA & LSX	
	One Switch	
	Sizes 30 & 40	
	2 req'd	1A7820 24052
	2 req'd	1A3369 24052
	Sizes 60 & 70	
	2 req'd	1A3444 24052
	2 req'd	1A3409 24052
	Two Switches (4 req'd)	
	Sizes 30 & 40	1A7820 24052
	Sizes 60 & 70	1A3444 24052
	Use w/GO-713760 switch (3 req'd for one switch; 2 req'd for two switches)	
	Sizes 30 & 40	1A3369 24052
	Sizes 60 & 70	1A3409 24052
34	Stud Post, zn pl steel (4 req'd) (not shown)	
	W/o handwheel	
	Use w/Type 3555T only	
	Sizes 30 & 40	12A9694 X012
	Sizes 60 & 70	12A9697 X012
35	Travel Indicator Scale, stainless steel	
	W/o handwheel	
	Use w/ or w/o switches or w/Type 3552	
	Sizes 30 & 40	28A8533 X012
	Sizes 60 & 70	28A8492 X012
	Use w/Type 3555T	12A9692 X012
36	Self Tapping Screw, steel (2 req'd)	1B5615 28982
37	Travel Indicator, stainless steel	
	W/o handwheel	
	Use w/o switches or w/Type 3555T, w/GO-713760 switch, w/Micro switches LSA & LSX or w/NAMCO limit switches	
	Sizes 30 & 40	28A8534 X012
	Sizes 60 & 70	28A8495 X012
	Use w/Types 304 & 3552	
	Sizes 30 & 40	28A8489 X012
	Sizes 60 & 70	28A8496 X012
	Use w/Micro Switches BZE6-2RN, DTE6-2RN, OP-AR, OPD-AR, EX-AR, & EXD-AR	
	Sizes 30 & 40	28A8490 X012
	Sizes 60 & 70	28A8494 X012

1. Trademark of Micro Switch Co.
2. Trademark of NAMCO Controls/ACME-Cleveland.
3. Trademark of General Equipment Co.

Key	Description	Part Number
38	Self-Tapping Screw, pl steel (2 req'd)	
	W/o handwheel	
	Use w/o switches or w/Type 3555T	1B5615 28982
	Use w/Types 304 & 3552	1B5613 X0012
	Use w/NAMCO limit switches & Micro switches LSA & LSX	1B2856 28982
	Use w/Micro switches OP-AR, OPD-AR, EX-AR, & EXD-AR	
	Sizes 30 & 40	1A5797 24052
	Sizes 60 & 70	1A3816 24052
	Use w/Micro switches BZE6-2RN & DTE6-2RN	
	Sizes 30 & 40	1B2905 24052
	Sizes 60 & 70	1A3816 24052
	Use w/GO-713760 switch	17A8779 X012
38	Cap Screw, pl steel (2 req'd)	
	Sizes 30 & 40	
	NAMCO limit switches	1A4078 24052
	Micro-Switches BZE6-2RN & DTE6-2RN	1B2905 24052
	OP-AR, OPD-AR, EX-AR, & EXD-AR	1A5797 24052
	Sizes 60 & 70	
	All switches	1A3816 24052
39	Cover Plate, steel (not req'd w/positioner)	22A9359 X012
40	Cap Screw, pl steel (4 req'd) (not req'd w/positioner)	1C2752 24052
41	Nameplate, stainless steel (specify manufacturing location, Marshalltown, Sherman, etc., from nameplate being replaced)	16A3188 X012
42	Drive Screw, stainless steel (4 req'd)	1A3682 28982
55	Vent Screen, Monel[4] (for aluminum constructions only) (not shown)	0L0783 43062
56	Warning Nameplate (not shown)	
	Type 1051	
	Sizes 30 & 40	12A9530 X012
	Size 60	12A9531 X012
	Type 1052	15A6972 X012
57	Turnbuckle, zn pl steel	
	Size 30	12A9623 X012
	Size 40	22A9625 X012
	Size 60	22A9624 X012
	Size 70	22A9630 X012
58	Hex Nut, zn pl steel	
	Size 30	12A9666 X012
	Size 40	12A9629 X012
	Sizes 60 & 70	1R4389 24122
59	Access Plate	
	Steel (for aluminum constructions only)	12A9638 X012
	Polyester (for cast iron constructions only)	38A4712 X012
60	Machine Screw, pl steel (for aluminum constructions only) (4 req'd)	1A3408 28992

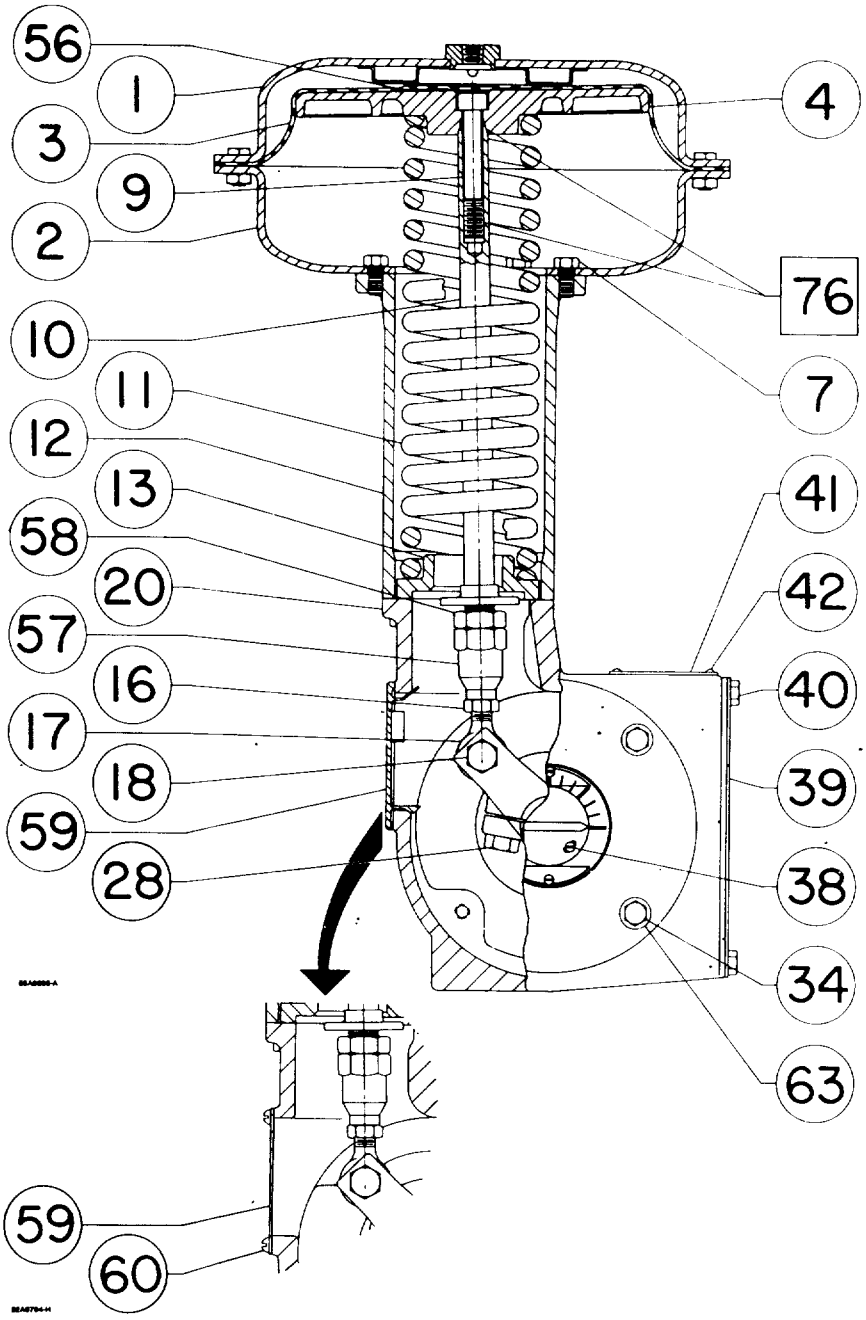
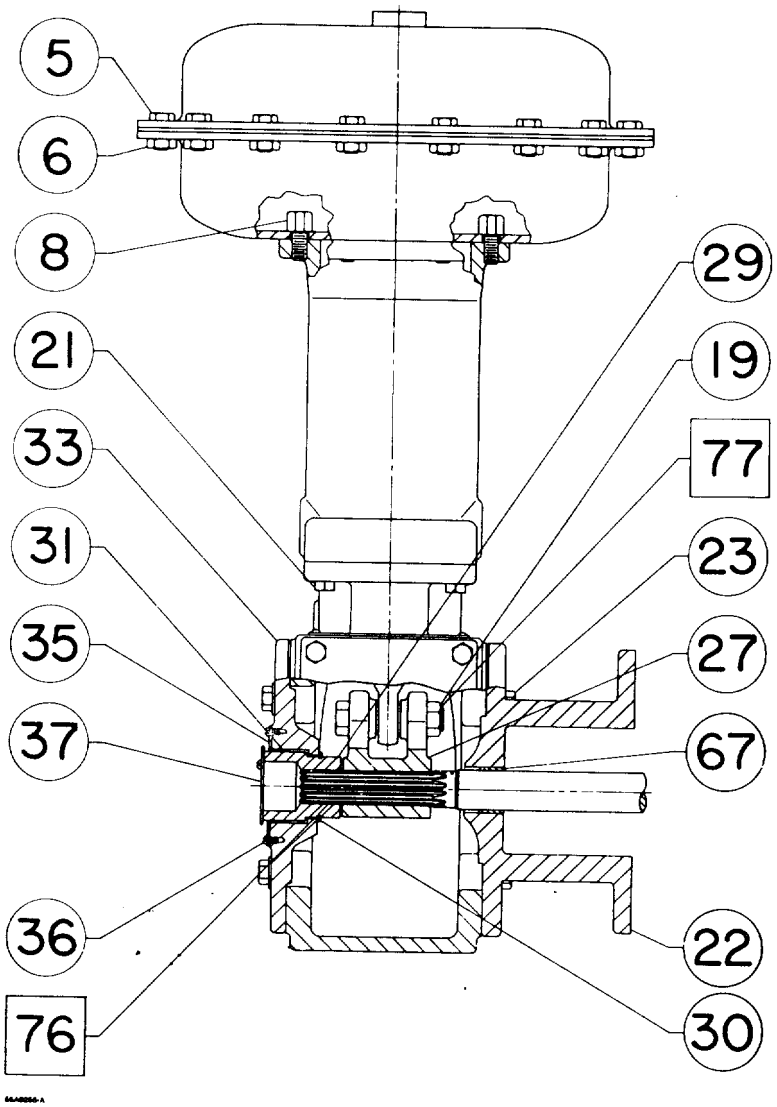


Figure 7. Typical Type 1051 Actuator Assembly

4. Trademark of International Nickel Co.



□ APPLY LUB/SEALANT

NOTE: KEYS 12 AND 21 ARE NOT REQUIRED FOR SIZE 30 ACTUATORS

Figure 7. Typical Type 1051 Actuator Assembly (Continued)

Key	Description	Part Number
63	Washer, zn pl steel (4 req'd)	
	Sizes 30 & 40	1H7231 25072
	Sizes 60 & 70	1A5189 25072
64	Travel Indicator, stainless steel (use w/Type 3555T only) (not shown)	12A9693 X012
65	Machine Screw, pl steel (use w/Type 3555T only) (not shown)	1C8990 28982
66	Travel Indicator Disc, steel (use w/Type 3555T only) (not shown)	22A9699 X012
67	Bushing	See following table
71	Thrust Bearing, steel (for Type 1052 only)	
	Sizes 30 & 40	10A4636 X012
	Size 60	1N8887 99012
	Size 70	16A9175 X012
72	Bearing Race, steel (2 req'd) (for Type 1052 only)	
	Sizes 30 & 40	10A4635 X012
	Size 60	1N8888 99012
	Size 70	16A9182 X012
73	Lower Bearing Seat Type 1052 only	
	Cast iron	
	Size 30	18A2474 X012
	Size 40	18A2482 X012
	Size 60	18A2479 X012
	Zn pl steel	
	Size 70	16A9176 X012
74	Adjustor (for Type 1052 only)	
	Zn pl steel	
	Size 30	18A2475 X012
	Size 40	18A2480 X012
	Size 60	18A2476 X012
	Brass	
	Size 70	26A9172 X012
75	Set Screw, steel (for Type 1052 size 70 only)	1C3451 28992
76	Lubriplate MAG-1 Lubricant, 14 oz (0.396 kg) can (not furnished with actuator)	1M1100 X0012
77	Loctite 271[5] Sealant, 10 cm^3 bottle (not furnished with actuator)	1M5933 X0012
78	Cap Screw, pl steel (use w/Butterfly valves only) (not shown)	
	3/8 & 1/2 in. (9.5 & 12.7 mm) valve shaft diameter (2 req'd)	1A3418 24052
	5/8 thru 1 in. (15.9 thru 25.4 mm) valve shaft diameter (4 req'd)	1A3418 24052
	1-1/4 & 1-1/2 in. (31.8 & 38.1 mm) valve shaft diameter (4 req'd)	1A5444 24052
82	Lower Diaphragm Head (use w/adj down stop only) (see figure 11)	
	Sizes 30 & 40, zinc	1E6827 44022
	Size 60, zinc	1E8455 44022
	Size 70, steel	16A9181 X012

5. Trademark of Loctite Corp.

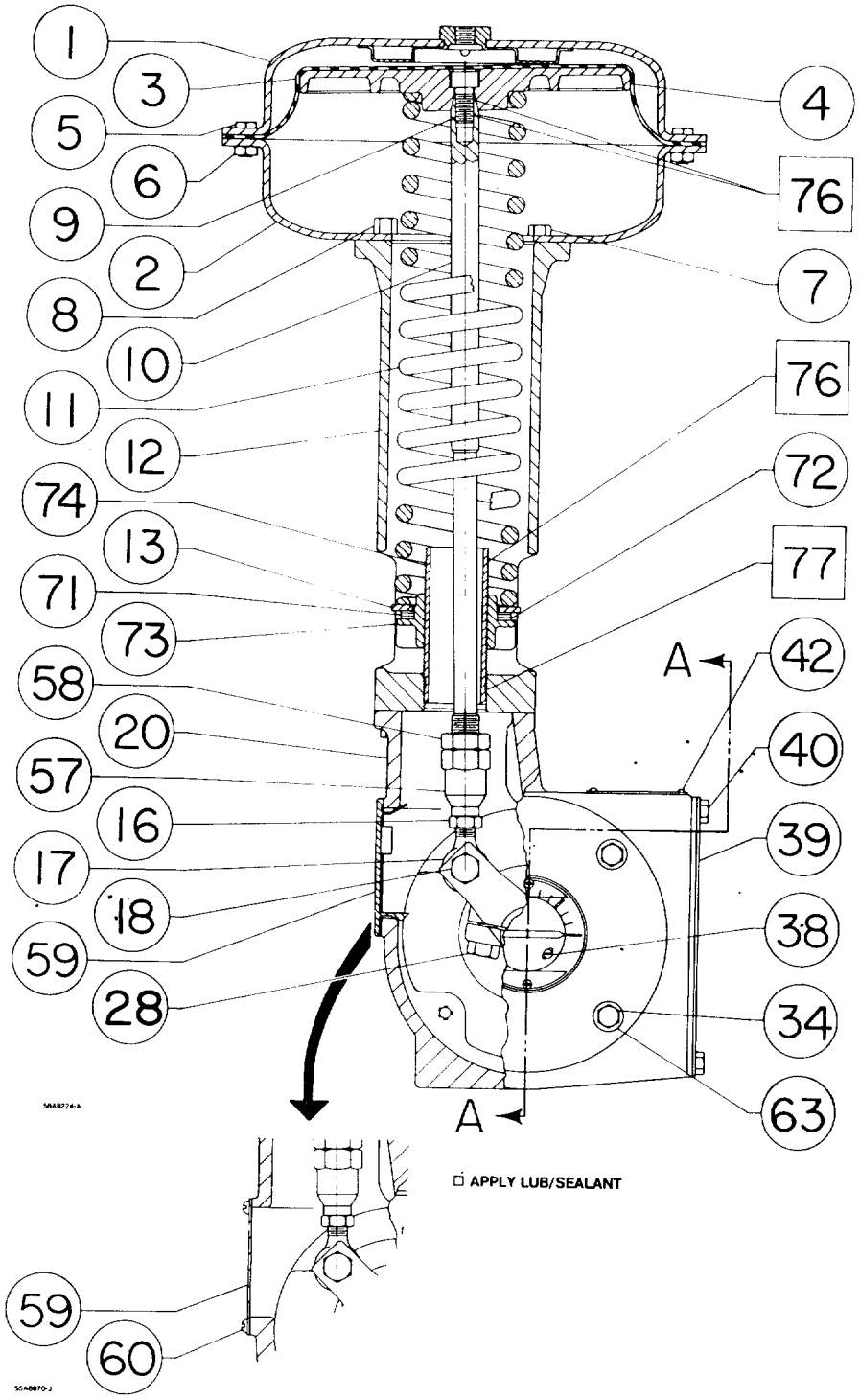
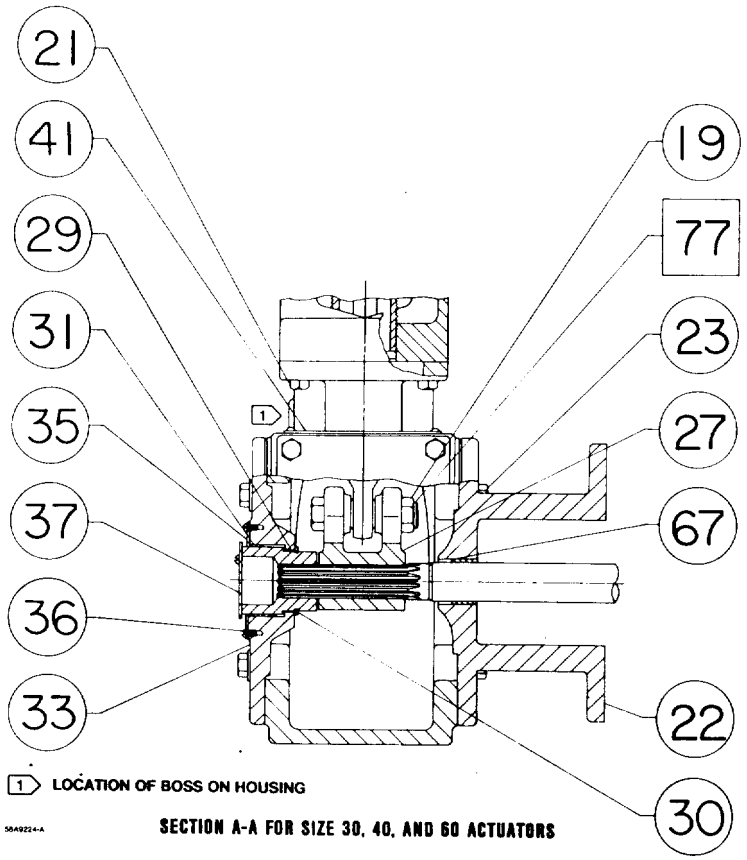


Figure 8. Typical Type 1052 Actuator Assembly



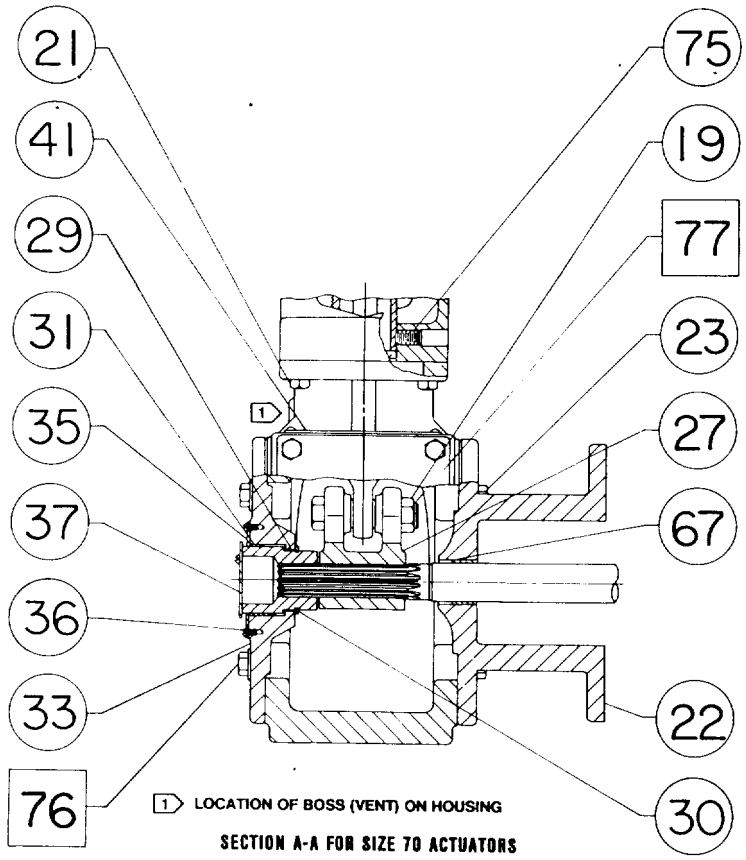


Figure 8. Typical Type 1052 Actuator Assembly (Continued)

Key 11 Spring[1], steel (for Type 1052 actuator only)

CASING PRESSURE		ACTUATOR SIZE	INITIAL SPRING COMPRESSION				KEY 11 SPRING PART NUMBER
			Push-down-to-open		Push-down-to-close		
Psig	Bar		Psig	Bar	Psig	Bar	
0-18	0-1.2	30	2.7	0.2	2.7	0.2	1F3616 27032
			3.1	0.2	3.0	0.2	1K5098 27032
			4.3	0.3	3.0	0.2	1N7515 27032
		40	3.0	0.2	3.0	0.2	1L2174 27042
			4.3	0.3	3.0	0.2	1P6371 27082
		60	3.7	0.3	3.0	0.2	1K1627 27082
			3.5	0.2	3.0	0.2	1N9373 27082
0-33	0-2.3	30	4.3	0.3	4.2	0.3	1N7515 27032
			---	0.3	3.0	0.2	1F1770 27092
			3.9	0.3	3.0	0.2	1F1771 27092
			---	0.2	3.0	0.2	1F1772 27092
		40	4.3	0.3	4.3	0.3	1P6371 27082
			6.0	0.4	3.0	0.2	1L2173 27042
			4.4	0.3	3.0	0.2	1N8440 27082
		60	3.5	0.2	3.5	0.2	1N9373 27082
			7.0	0.5	3.0	0.2	1K1628 27082
			6.8	0.5	3.0	0.2	1P2702 27042
		70	10.1	0.7	3.0	0.2	1F6760 27082
0-40	0-2.8	30	3.7	0.3	3.7	0.3	1F1770 27092
			3.9	0.3	3.0	0.2	1F1771 27092
			---	---	3.0	0.2	1F1772 27092
		40	4.4	0.3	3.0	0.2	1N8440 27082
			6.0	0.4	3.0	0.2	1L2173 27042
		60	6.8	0.5	3.0	0.2	1P2702 27042
			7.0	0.5	3.1	0.2	1K1628 27082
		70	10.1	0.7	3.3	0.2	1R6760 27082
0-55	0-3.8	30	3.1	0.2	3.1	0.2	1F1772 27092
		40	4.4	0.3	3.5	0.2	1N8440 27082
		70	10.1	0.7	10.1	0.7	1R6760 27082
3-15	0.2-1.0	30	---	---	3.0	0.2	1K5098 27032
		40	---	---	3.0	0.2	1L2174 27042
		60	3.7	0.3	3.0	0.2	1K1627 27082
3-30	0.2-2.1	30	---	---	3.1	0.2	1F1770 27092
			---	---	3.0	0.2	1F1771 27092
			---	---	3.0	0.2	1F1772 27092
			4.3	0.3	4.2	0.3	1N7515 27032
		40	4.3	0.3	4.3	0.3	1P6371 27082
			6.0	0.4	3.0	0.2	1L2173 27042
			---	---	3.0	0.2	1N8440 27082
		60	3.5	0.2	3.5	0.2	1N9373 27082
			7.0	0.5	3.0	0.2	1K1628 27082
			---	---	3.0	0.2	1P2702 27042
		70	10.1	0.7	3.0	0.2	1R6760 27082

1. For more detailed ordering information concerning proper spring selection to obtain the torque required by the valve, consult your Fisher sales office or sales representative.

Key 11 Spring[1], steel (for Type 1051 actuator only)
Key 13 Spring Seat[1], steel (for Type 1051 actuator only)

CASING PRESSURE		ACTUATOR SIZE	KEY 11 SPRING PART NUMBER	KEY 13 SPRING SEAT PART NUMBER
Psig	Bar			
0-18	0-1.2	30	1K5098 27032 1F3616 27032	12A9445 X012 12A9445 X012
		40	1L2174 27042	12A9447 X012
		60	1K1627 27082 1N9373 27082 1N9373 27082	12A9450 X012 12A9448 X012 12A9449 X012
0-33	0-2.3	30	1N7515 27032	12A9445 X012
		40	1L2173 27042 1P6371 27082	12A9446 X012 12A9447 X012
		60	1K1628 27082 1K1628 27082 1N9373 27082 1N9373 27082	12A9448 X012 12A9449 X012 12A9448 X012 12A9449 X012
0-40	0-2.8	40	1L2173 27042	12A9446 X012
		60	1K1628 27082 1K1628 27082	12A9448 X012 12A9449 X012
0-55	0-3.8	40	1L2173 27042	12A9446 X012
3-15	0.2-1.0	60	1K1627 27082	12A9450 X012
3-30	0.2-2.1	30	1N7515 27032	12A9445 X012
		40	1L2173 27042 1P6371 27082	12A9446 X012 12A9447 X012
		60	1K1628 27082 1N9373 27082	12A9449 X012 12A9449 X012

1. For more detailed ordering information concerning proper spring and spring seat selection to obtain the torque required by the valve, contact your Fisher sales office or sales representative.

Keys 22 and 67 Mounting Yoke[1] Parts

VALVE DESIGN	ACTUATOR SIZE	VALVE SHAFT DIAMETER		KEY 22 YOKE-BUSHING ASSEMBLY CAST IRON & TFE	KEY 22 YOKE, CAST IRON	KEY 67 BUSHING, TFE
		In.	mm			
ēdisc®, V100, & 7800 (2-12 in.)	30 & 40	1/2	12.7	12A9799 X0A2	- - -	1U9025 99402
		5/8	15.9	12A9799 X0B2	- - -	12A9555 X012
		3/4	19.1	12A9799 X0C2	- - -	12A9556 X012
	40	7/8	22.2	12A9799 X0E2	- - -	12A9557 X012
		1	25.4	12A9799 X0G2	- - -	12A9775 X012
		1-1/4	31.8	12A9799 X112	- - -	12A9558 X012
	60	3/4	19.1	12A9799 X0D2	- - -	12A9556 X012
		7/8	22.2	12A9799 X0F2	- - -	12A9557 X012
		1	25.4	12A9799 X0H2	- - -	12A9775 X012
	60 & 70	1-1/4	31.8	12A9799 X0J2	- - -	12A9558 X012
		1-1/2	38.1	12A9799 X0K2	- - -	12A9559 X012
		1-3/4	44.5	12A9799 X0L2	- - -	10A3848 X012
		2	50.8	12A9799 X0M2	- - -	12A9715 X012
7600, 7800 (14-36 in.), & 9500	30 & 40	1/2	12.7	- - -	32A9755 X012	1U9025 99402
		5/8	15.9	- - -	32A9742 X012	12A9555 X012
		3/4	19.1	- - -	32A9743 X012	12A9556 X012
	40	1	25.4	- - -	32A9757 X012	12A9775 X012
		1-1/4	31.8	- - -	32A9746 X012	12A9558 X012
	60	3/4	19.1	- - -	32A9750 X012	12A9556 X012
		1	25.4	- - -	32A9778 X012	12A9775 X012
	60 & 70	1-1/4	31.8	- - -	32A9753 X012	12A9558 X012
		1-1/2	38.1	- - -	32A9754 X012	12A9559 X012
		1-3/4	44.5	- - -	35A9704 X012	12A9560 X012
		2	50.8	- - -	35A9705 X012	12A9561 X012

1. Yokes for use with ēdisc® and Design V100 valves are available only as yoke-bushing assemblies; however, the bushing is also available as a replacement part.

Key 27 Lever, ductile iron

ACTUATOR SIZE	SHAFT DIAMETER		PART NUMBER
	In.	mm	
30	1/2	12.7	32A9578 X012
	5/8	15.9	32A9579 X012
	3/4	19.1	32A9672 X012
40	1/2	12.7	32A9567 X012
	5/8	15.9	32A9568 X012
	3/4	19.1	32A9569 X012
	7/8 & 1	22.2 & 25.4	32A9570 X012
	1-1/4	31.8	32A9571 X012
60	3/4	19.1	32A9589 X012
	7/8 & 1	22.2 & 25.4	32A9590 X012
	1-1/4	31.8	32A9591 X012
	1-1/2	38.1	32A9592 X012
	1-3/4 & 2	44.5 & 50.8	34A5322 X012
70	1-1/4	31.8	32A9575 X012
	1-1/2	38.1	32A9576 X012
	1-3/4 & 2	44.5 & 50.8	32A9679 X012

Key 29 Hub, aluminum or 416 stainless steel (depending on manufacturing location)

ACTUATOR SIZE	VALVE SHAFT DIAMETER		STANDARD OR W/TYPES 304 & 3552 OR W/GO-713760 SWITCH	W/TYPE 3555T, NAMCO LIMIT SWITCHES, & MICRO SWITCHES LSA & LSX	W/MICRO SWITCHES[1]
	In.	mm			
30 & 40	1/2	12.7	22A9496 X012	22A9706 X012	24A3380 X012
	5/8	15.9	22A9419 X012	22A9701 X012	24A3211 X012
	3/4	19.1	22A9497 X012	22A9704 X012	24A2188 X012
40	7/8 & 1	22.2 & 25.4	22A9486 X012	22A9705 X012	24A3245 X012
	1-1/4	31.8	22A9498 X012	22A9703 X012	- - -
60 & 70	3/4	19.1	22A9499 X012	22A9708 X012	23A7813 X012
	7/8 & 1	22.2 & 25.4	22A9420 X012	22A9710 X012	22A9633 X012
	1-1/4	31.8	22A9500 X012	22A9709 X012	22A9547 X012
	1-1/2	38.1	22A9501 X012	22A9707 X012	22A9550 X012
	1-3/4 & 2	44.5 & 50.4	24A6358 X012	25A1600 X012	- - -

1. Does not include Micro Switches LSA & LSX.

Top-Mounted Handwheels

Key	Description	Part Number
51	Handwheel, cast iron	
	Size 30	1F1181 19042
	Size 40	16A0956 X012
	Size 60	
	Push-down-to-close valve	38A2309 X012
	Push-down-to-open valve	38A2310 X012
	Size 70	2A1937 19042
54	Hex Nut, pl steel	
	Sizes, 30, 40, & 60	1A3537 24122
	Size 70	1A3540 24122
133	Stem, bronze	
	Size 30	27A9645 X012
	Size 40	27A9643 X012
	Size 60	27A9642 X012
	Size 70	27A9664 X012
134	Washer, pl steel	
	Sizes 30, 40, & 60	1A5189 25072
	Size 70	1A3539 28992
135	Pusher	
	Sizes 30 & 40, pl steel	1F1179 99012
	Size 60, pl steel	1F1183 99012
	Size 70, cast iron	1R6796 19022
137	Hex Nut, zn pl steel	
	Sizes 30, 40, & 60	18A2300 X012
	Size 70	18A2301 X022
138*	O-Ring, nitrile	
	Sizes 30 & 40	1D2375 06992
	Size 60	1B8855 06992
	Size 70	1C4157 06992
139*	O-Ring, nitrile	
	Sizes 30 & 40	1D2673 06992
	Size 60	1D5471 06992
	Size 70	1D2691 06992
140	Groove Pin	
	Sizes 30 & 40, steel	1F1180 28992
	Size 60, stainless steel	1B6270 35072
141	Cap Screw, pl steel	
	Sizes 30 & 40 (6 req'd)	1A3684 24052
	Size 60 (8 req'd)	1A3684 24052
	Size 70 (12 req'd)	1N1293 28992
142	Body, cast iron	
	Size 30	37A9443 X012
	Size 40	2N1687 19012
	Size 60	2K9494 19012
	Size 70	37A9662 X012
164	Body Extension, steel	
	Size 40	17A9658 X012
	Size 60	17A9657 X012
169	Grease Fitting, steel (for size 70 only)	1L8478 28992
171	Spacer, 416 stainless steel (for size 60 only)	10A0057 X012
174	Retaining Screw, steel (for size 70 only)	1R6797 24092
175	Thrust Bearing, steel (for size 70 only)	1N8380 99012
176	Thrust Race, steel (for size 70 only)	1N8381 99012
241	Lubriplate, MAG-1 Lubricant, 14 oz (0.396 kg) can (not furnished with actuator)	1M1100 X0012
242	Loctite No. 271 Sealant, 10 cm^3 bottle (not furnished with actuator) (for size 70 only)	1M5933 X0012

*Recommended spare parts

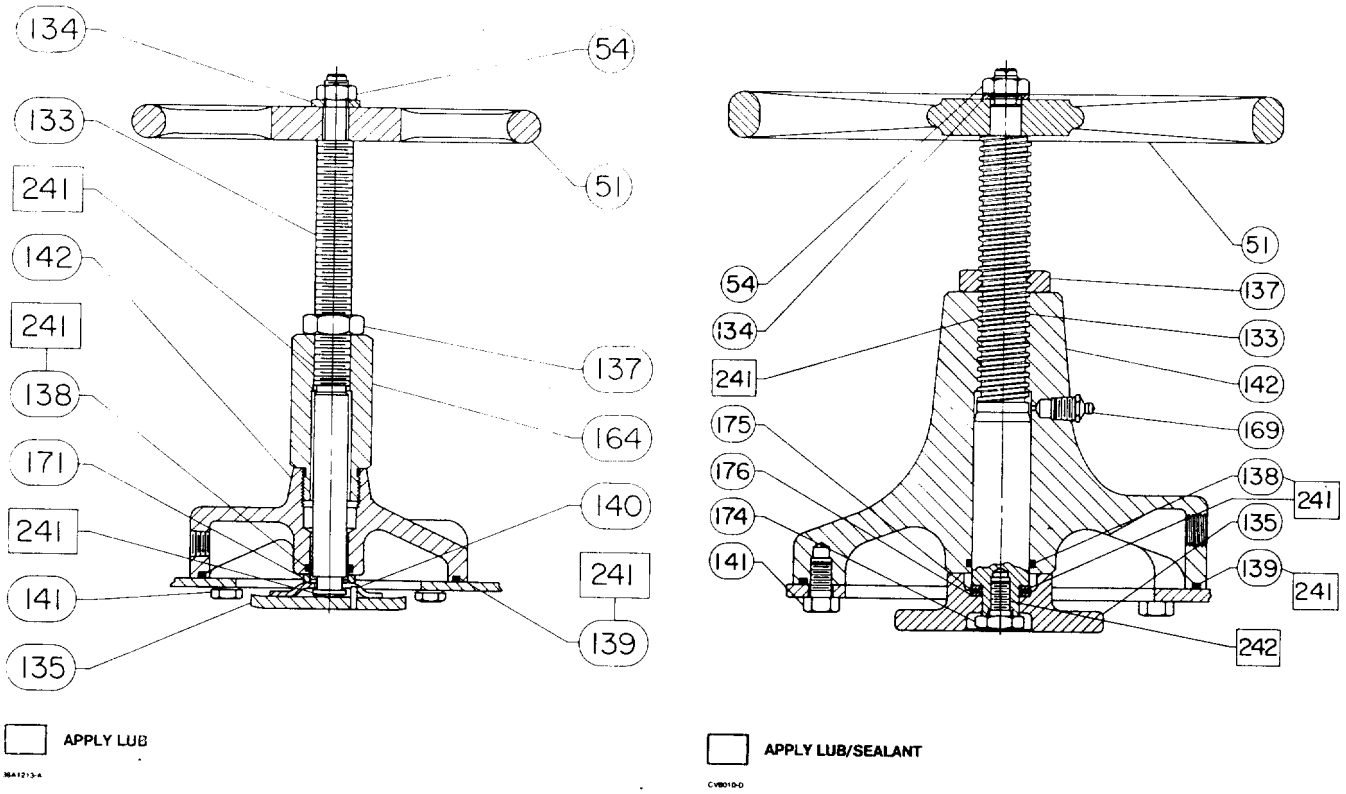
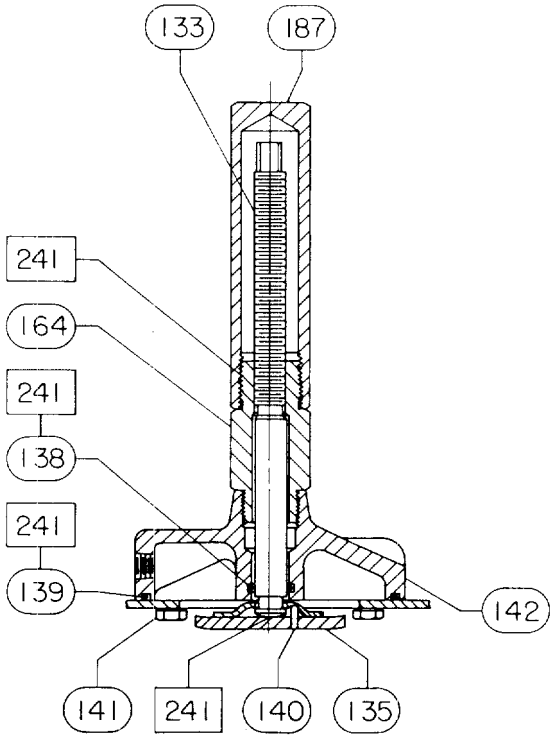
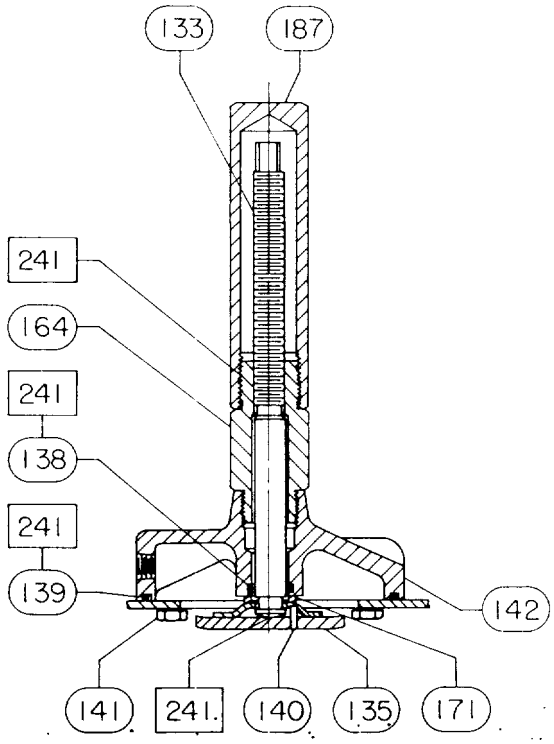


Figure 9. Top-Mounted Handwheel Assemblies

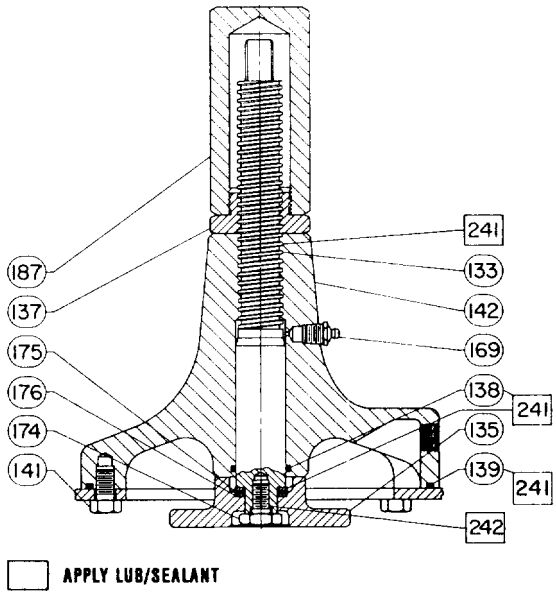
Key	Description	Part Number
Adjustable Up Travel Stop		
133	Stem, bronze	
	Sizes 30 & 40	27A9651 X012
	Size 60	27A9647 X012
	Size 70	27A9666 X012
135	Pusher	
	Sizes 30 & 40, steel	1F1179 99012
	Size 60, steel	1F1183 99012
	Size 70, cast iron	1R6796 19022
137	Travel Stop Nut, brass (for size 70 only)	18A2304 X012
138	O-Ring, nitrile	
	Sizes 30 & 40	1D2375 06992
	Size 60	1B8855 06992
	Size 70	1C4157 06992
139	O-Ring, nitrile	
	Sizes 30 & 40	1D2673 06992
	Size 60	1D5471 06992
	Size 70	1D2691 06992
140	Groove Pin	
	Sizes 30 & 40, steel	1F1180 28992
	Size 60, stainless steel	1B6270 35072
141	Cap Screw, pl steel	
	Sizes 30 & 40 (6 req'd)	1A3684 24052
	Size 60 (8 req'd)	1A3684 24052
	Size 70 (12 req'd)	1N1293 28992
142	Body, cast iron	
	Sizes 30 & 40	2N1687 19012
	Size 60	2K9494 19012
	Size 70	37A9662 X012
164	Body Extension, steel	
	Sizes 30 & 40	17A9660 X012
	Size 60	17A9659 X012
169	Grease Fitting (for size 70 only)	1L8478 28992
171	Spacer, 416 stainless steel (for size 60 only)	10A0057 X012
174	Retaining Screw, steel (for size 70 only)	1R6797 24092
175	Thrust Bearing, steel (for size 70 only)	1N8380 99012
176	Thrust Race (2 req'd) (for size 70 only)	1N8381 99012
187	Closing Cap, brass	
	Sizes 30 & 40	1V1369 14012
	Size 60	1U2905 14012
	Size 70	1U9563 14012
241	Lubriplate MAG-1 Lubricant, 14 oz (0.396 kg) can (not furnished with actuator)	1M1100 X0012
242	Loctite No. 271 Sealant, 10 cm^3 bottle (not furnished with actuator) (for size 70 only)	1M5933 X0012



ADJUSTABLE UP TRAVEL STOP FOR SIZE 30 AND 40 ACTUATORS



ADJUSTABLE UP TRAVEL STOP FOR SIZE 60 ACTUATORS



ADJUSTABLE UP TRAVEL STOP FOR SIZE 70 TYPE 1052 ACTUATORS

Figure 10. Adjustable Up Travel Stops

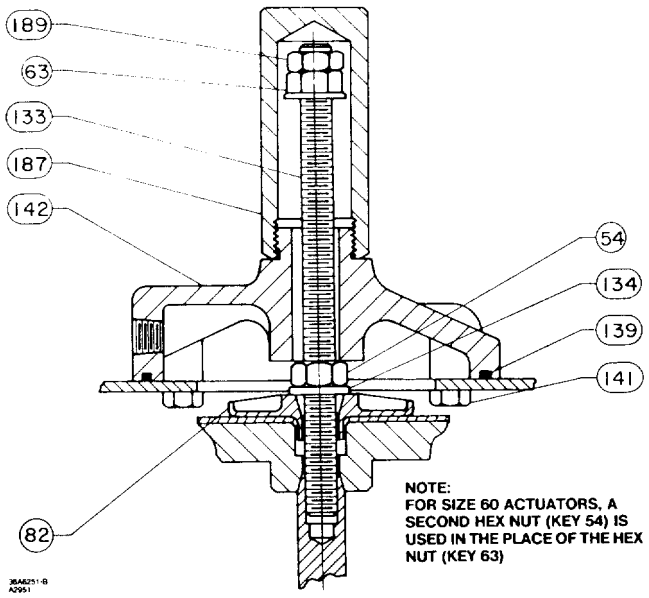


Figure 11. Adjustable Down Travel Stop

Key	Description	Part Number
Adjustable Down Travel Stop		
54	Hex Nut, pl steel	
	Type 1051	
	Sizes 30 & 40 (1 req'd	1A3412 24122
	Size 60 (2 req'd)	1A3681 24122
	Type 1052	
	Sizes 30 & 40 (1 req'd)	1A4132 24122
	Size 60 (2 req'd)	1A3754 24122
	Size 70 (1 req'd)	1A3511 24122
63	Hex Nut, pl steel	
	Type 1051	
	Sizes 30 & 40 only	15A9617 X012
	Type 1052	
	Sizes 30, 40, & 60	16A6715 X012
	Size 70	16A9178 X012
133	Stem, stainless steel	
	Type 1051	
	Size 30	17A1803 X012
	Size 40	17A1804 X012
	Size 60	17A1805 X012
	Type 1052	
	Size 30	16A6247 X012
	Size 40	16A6692 X012
	Size 60	16A6693 X012
	Size 70	16A9180 X012
134	Lockwasher, pl steel	
	Sizes 30 & 40	16A1352 X012
	Size 60	15A7932 X012
	Size 70	1E8336 28992
139*	O-Ring, nitrile	
	Sizes 30 & 40	1D2673 06992
	Size 60	1D5471 06992
	Size 70	1D2691 06992
141	Cap Screw, pl steel	
	Sizes 30, 40, & 60 (6 req'd)	1A3684 24052
	Size 70 (12 req'd)	1N1293 28992
142	Body, cast iron	
	Sizes 30 & 40	36A6248 X012
	Size 60	36A6249 X012
	Size 70	36A9177 X012
187	Closing Cap, brass	
	Size 30	1P7254 14012
	Size 40	1P8608 14012
	Size 60	1U2905 14012
	Size 70	26A9179 X012
189	Jam Nut, pl steel	
	Type 1051	
	Sizes 30 & 40	1A3524 24122
	Size 60	1A5993 24122
	Type 1052	
	Sizes 30 & 40	1A3537 24122
	Sizes 60 & 70	1A3511 24122

*Recommended spare part.

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